chapter S

Power

S 1–93. General note.

Energy to meet the expanding power needs of our economy has been secured from various animate and inanimate sources. Among those of historical significance, whose use is generally within the control of mankind, are human and animal power, waterpower, windpower, wood and other vegetable matter used as fuel, coal, oil, and natural gas. Currently, efforts are being made to develop and control solar energy, atomic energy, internal heat of the earth, and, through chemical processing, certain additional natural resources such as shale and sea water. For those interested in developing a comprehensive understanding of power problems the following books are suggested: Eugene Ayers and Charles A. Scarlott, *Energy Sources —The Wealth of the World*, McGraw-Hill Publishing Company, Inc., 1952; Fred Cottrell, *Energy and Society*, McGraw-Hill Publishing Company, Inc., 1955; J. F. Dewhurst and Associates, *America's Needs and Resources, A New Survey*, The Twentieth Century Fund, 1955; P. C. Putnam, *Energy in the Future*, D. Van Nostrand Company, Inc., 1953.

Preparation of historical tables showing energy from various sources and total energy input on a per capita or other basis is complicated. The amounts shown will differ greatly depending on the basis and point of measurement used. End-use data, for example, will show far larger increases in total per capita over the last 100 years than will data presenting physical measures such as tons, gallons, cubic feet, or B.t.u.'s because of increased efficiency in conversion and utilization. During the 50-year period 1907–1957 reduction of the total energy required or lost in coal mining, in moving the coal from mine to point of utilization, in converting to electric energy, in delivering the electric energy to consumers, and in converting electric energy to end uses have increased by well over 10 times the energy needs supplied by a ton of coal as a natural resource.

Data on energy available from mineral fuels, waterpower for electric energy, and fuel wood are shown in series M 71–87. For total waterpower, net imports from waterpower sources in Canada and the energy equivalent of waterpower not converted to electric energy (direct drive from water wheels) must also be considered. Statistics available for power sources not included here are presented in the volumes by Ayers and Scarlott, Dewhurst, and Putnam, cited above. Government agencies such as the Bureau of Mines, Bureau of the Census, Rural Electrification Administration, Bureau of Labor Statistics, Federal Power Commission, Federal Reserve Board, Interstate Commerce Commission; the various trade associations such as the Edison Electric Institute, American Gas Association, Bituminous Coal Institute, American Petroleum Institute; and various technical journals, particularly in their statistical issues, compile or summarize and publish data on the development and use of energy for power and related purposes.

S 1–14. Total horsepower of all prime movers, 1849–1955.

Source: 1849–1952, J. F. Dewhurst and Associates, *America's Needs and Resources, A New Survey*, The Twentieth Century Fund, 1955, p. 1117; 1955, estimates prepared by John A. Waring for *Transactions of Canadian Sectional Meeting, World Power Conference, 1958* (in press).

Data for series S 4 (work animals), S 10 (sailing vessels), and S 12 (windmills), as shown on p. 1117 of *America's Needs and Resources*, are based on data presented in appendix 25-3 of that volume. All other data for 1849–1919 are from C. R. Daugherty, A. H. Horton, and R. W. Davenport, *Power Capacity and Production in the United States*, Water Supply Paper No. 579, Geological Survey, 1928. The original data from Daugherty, *et al.* were for 1849 and subsequent 10-year intervals through 1919. Estimates for 1850 and subsequent 10-year intervals through 1940 are based on straight-line interpolation of original data.

All data for 1929, 1939, 1950, and 1952 shown in Dewhurst were prepared by John A. Waring. According to Waring, estimates for 1952 as shown in Dewhurst are too low for mines and farms, and too high for railroad locomotives.

A technical and statistical bibliography of early data pertaining to the development of horsepower equipment in the United States appears on pp. 43 and 44 of Daugherty, *et al.* This source also contains a section on the sources and accuracy of the data. The following appraisal of the data appears on p. 21: "In general the accuracy of the statistics presented . . . increases with each successive decade. The data for the early years are almost wholly estimated, but it is believed that the estimates are supported by bases accurate enough to lend a degree of authenticity to them."

In addition to the classifications shown in series S 1–14, the installed mechanical horsepower in a number of special industries were also calculated for 1955 by Waring, as follows: Waterworks pumping stations, 1,700,000; communications standby reserve generators, 308,930; gas utility stations, 1,775,800; motorboats and yachts, 25,450,000; outboard-powered boats, 33,680,000; petroleum pipeline pumping stations, 3,603,750; natural gas pipeline pumping stations, 3,881,200; isolated nonindustrial power plants, 5,170,000; underground gas storage pools, 301,000; construction and contractors' building equipment, 53,403,750. These total 129,274,430 horsepower, which, when added to the 1955 total shown in series S 1, result in an aggregate total of 7,272,997,430 horsepower.

S 15–93. General note.

Some data on the production and use of electric energy are available since the beginning of commercial production in 1882. Data for 1882–1920, however, are difficult to evaluate because of changing bases of measurement and variations in coverage of the various censuses or other surveys made during the period. The Bureau of the Census published the results of censuses of the electric light and power industries made at 5-year intervals for 1902–1937, and the reports of the Census of Manufactures and of Mineral Industries contain important data on industrial use and production of electric energy. The Geological Survey, the *Electrical World* (McGraw-Hill Publishing Company, Inc., New York), and the National Electric Light Association also published considerable data applicable to the industry during this early period.

The chief gaps in the data for these years are in the production of electric energy by industrial establishments for their own use, and in the measurement of the sales by electric railroads and railways for public distribution. Early

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data on capacity must be converted from horsepower (hp.) to kilowatts (kw.) to be comparable; and capacity data in kilovolt-amperes (kv.-a.) were often tabulated as kw. without adjustment for power factor. Data on generation were also often reported without allowance for the kilowatt-hours (kw.-hr.) used in production and, in many instances, where the prime mover was used both for direct drive and for electric generation, the kw.-hr. equivalent of power used directly was reported as generation. End uses were reported by appliances, as number of lamps, arc lights, or motors, rather than as kw.-hr. These variations in units of measurements, in classification, and in coverage often resulted in differences in estimated totals of as much as 20 to 25 percent. In presenting historical data on electric energy since 1902, efforts have been made to resolve such differences and place the data on a comparable basis.

Referring to various historical sources it will be noted that data published in later years will frequently show material revisions to reflect changes in classification and coverage. In the utility series prior to 1945, for example, when a large generating plant was purchased from an industrial concern, the utility series would be adjusted to include the capacity and generation of this plant in prior years. Where such revisions have been made, the revised data are shown.

Since 1920, comprehensive statistics on capacity and generation of electric utilities for public use have been compiled and published by the Geological Survey for 1920–1936, and by the Federal Power Commission since 1936. Data on capacity and generation by nonutility establishments since 1939 have been compiled and published by the Federal Power Commission. The Commission also published financial, operating, sales, and rate statistics for the electric utility industry. Data on customers, revenues, sales, and related matters since 1926 are published by the Edison Electric Institute and the McGraw-Hill Publishing Co., Inc., *Electrical World.*

During the 20 years prior to 1957 there was a marked growth in the application of power from various fuels through electric energy produced not only in central stations but by generators in mobile equipment of many types. Among these are power plants in ships, railroad locomotives, trailers, barges, trucks, tractors, buses, and in machines used in mining and heavy construction which produce electric energy for driving and operating the mobile unit and for other services related thereto, or to supplement central stations for temporary periods. Also of interest are the electric generators for auxiliary purposes operated directly or indirectly by the prime movers in automobiles, airplanes, and other mobile engines or by independent power units in refrigerator cars and trailers and many other installations to furnish electric energy directly or to maintain the electric charge in batteries for use as required. The importance of these small generators is indicated by the fact that the 65 million motor vehicles registered in the United States in 1956 alone have a total generator capacity in excess of that of all the Federally owned electric utilities. Except where large units in the general classification of mobile plants are connected to utility systems for power for extended periods neither capacity nor generation are included in the data indicating production and use of electric energy in the United States. In some cases, however, industries will report the horsepower of such equipment as driving generators, but, in general, do not indicate power output in kw.-hr.

S 15–18. Net production of electric energy, by central stations, by type of prime mover, 1902–1957.

Source: Summation of series S 19–26.

S 19–22. Net production of electric energy, by electric utilities, by type of prime mover, 1902–1957.

Source: 1902–1917, Bureau of the Census, *Census of Electrical Industries: Central Electric Light and Power Stations;* 1920–1957, Federal Power Commission, *Production of Electric Energy and Capacity of Generating Plants,* monthly and annual reports.

Census data for 1902–1917 have been adjusted in some instances for classification and coverage by L. D. Jennings of the Federal Power Commission. The figures for electric energy produced by waterpower for 1912 and 1917, for example, differ from those published in *Central Electric Light and Power Stations: 1917,* table 26, because they have been adjusted to exclude electricity produced by steam and internal combustion engines at plants which also produced energy by waterpower, and energy produced in plants subsequently included in series S 23–26.

For 1920–1957, data are based on monthly reports by electric utilities to the Federal Power Commission. Coverage is substantially 100 percent. Included are plants of the privately owned electric utilities, the cooperatively owned systems, and the publicly owned electric utilities. The latter group is composed of the following classes: Municipal electric utilities, Federal projects, public utility power districts, and State power projects.

S 23–26. Net production of electric energy, by industrial establishments, by type of prime mover, 1902–1957.

Source: 1902–1941, Federal Power Commission, records; 1942–1957, *Production of Electric Energy and Capacity of Generating Plants,* monthly and annual reports.

Data include the generation of electric energy by manufacturing and extracting industries and by electric railroads and railways, but exclude electric energy generated by the following sources: Nonutility central station plants of less than 100 kw. capacity; plants operated by hotels, apartment houses, office buildings, or other commercial, transport, or service establishments; plants in military installations; new industrial plants which are not added promptly as reporting establishments; and, in some instances, generation of newly installed utility plants during test periods. The total central station generation excluded is estimated as about 1½ percent of the annual total shown for both utility and industrial plants. This percentage has declined in recent years with the development of mobile type generators.

Data for steam and internal combustion prime movers are processed separately and are combined when annual reports are completed. For 1938–1942, data on capacity by type of prime mover, and on total generation, are available from data reported to the Commission. As most plants had only one type of prime mover, the area to be estimated was limited, and detailed data for subsequent years were available as a basis for preparing such distribution. For 1902–1940, data for a portion of these plants are available from FPC S-20, *Electric Power Statistics, 1920–1940,* and from the data presented in the reports of the Census of Electrical Industries issued for each 5 years, 1902–1937. Data on capacity of prime movers driving generators also appear in various reports of the Census of Manufactures and the Census of Mineral Industries, particularly those for 1929 and 1939; from papers published by the Geological Survey; from technical and trade publications; and from special studies made by various governmental agencies and others. For 1938–1950, there was considerable effort on the part of a number of Federal agencies (Department of Commerce, Department of the Interior, Department of Defense, War Production Board, Executive Offices of the President, Federal Power Commission, Atomic

Energy Commission, and others) to develop historical data relating to power by utilizing data on capacity and use to estimate generation for segments where reported data on generation were incomplete or not available. These studies resulted in the development of the data shown.

In interpreting the data, it should be noted that the coverage may have varied during the period. For 1955, for example, approximately 250,000 kw. capacity with related generation for plants operated by transport industries (pipelines and nonelectrified railroads), and by certain miscellaneous establishments, were dropped because the plants were small, generally under 1,000 kw. capacity each, and the coverage for these industries was becoming increasingly incomplete. The cost of securing full coverage and processing these data was considered unreasonable for the relative amount of energy involved. At the same time, however, approximately an equivalent capacity and generation were added by the inclusion of plants in manufacturing industries previously excluded for security and other reasons. For 1956, however, additional information indicated that certain of the larger plants excluded with the pipeline group would now be classified in the extracting industry and they were again included. Further, in the usual methods for compiling such statistics there are delays in adding new plants while plants retired are excluded promptly. Changes in coverage of these types normally will not affect materially the relative annual amounts for nonutility central station electric generation excluded from this classification.

S 27–35. Net production of electric energy, by central stations, by class of ownership, 1902–1957.

Source: Series S 27–34, see source for series S 19–22; series S 35, see source for series S 23–26.

The FPC reports cited above show data for "noncentral stations" within the publicly owned group for 1920–1951. This category, which includes plants supplying electric power primarily for such functions as public street lighting, water pumping, and sewage disposal, have been included in municipal or other named classifications for 1952–1957. A similar adjustment using records available was made for 1920–1951.

Data for cooperatively owned utilities (series S 30) are shown in the source combined with power districts and State projects. The separate data for series S 30 were obtained from the detailed records of the Federal Power Commission. These amounts are slightly below those reported by the Rural Electrification Administration, *Annual Statistical Report—Rural Electrification Borrowers*, because a few plants financed by the REA are included in other classifications or are not, for various reasons, included in the Federal Power Commission totals.

S 36–43. Consumption of fuels by electric utilities, 1920–1957.

Source: Federal Power Commission, *Consumption of Fuel for Production of Electric Energy*, monthly and annual reports.

For series S 42–43, data for years prior to 1940 are from the records of the Federal Power Commission or may be computed from the data shown for fuel used and electric energy generated. For 1920–1938, the distribution of energy generated for plants using two or more kinds of fuel was estimated.

The data are based on individual generating plant reports submitted monthly by all electric utilities to the Federal Power Commission. Both the privately owned and publicly owned operations are included. The coal figures include anthracite, bituminous, and lignite coal—processed separately for the detailed report—and small amounts of coke; those for oil include crude oil, fuel oil, distillate pitch, sludge, and small quantities of other liquid fuels. The consumption of gas includes both natural gas and byproduct manufactured gas. In general, the minor fuels are reported in units equivalent to those for the major class of fuel with which they are combined. The quantities of each fuel include the consumption of generating plants operating on a standby or other intermittent basis.

Data on fuels used in industrial electric generating plants are not solicited as many establishments do not keep such records separate from fuels used for other purposes.

Kilowatt-hour production represents the summation of net station output after deduction for energy used in the operation of auxiliary equipment and facilities within the generating plants. Where two or more kinds of fuel are used at a particular plant during the same month, allocation of the kilowatt-hour production to each fuel is reported. Where such allocations are not made by the reporting utility, they are estimated on the basis of the latest available annual average B.t.u. content of each fuel used at that plant and the average B.t.u. per kw.-hr. generated reported for each kind of fuel.

S 44–48. Number of electric utility generating plants, and production per kilowatt of installed generating capacity, 1902–1957.

Source: See source for series S 19–22.

Figures for series S 48 are based on beginning- and end-of-year average installed generating capacity, except for 1902–1920 when capacity of the end of the year was used.

In counting the number of generating plants, each prime mover type in combination plants was included separately. Generating capacity is based on the nameplate rating of generators.

S 49–52. Installed generating capacity in central stations, by type of prime mover, 1902–1957.

Source: Summation of series S 53–60.

See also text for series S 19–22 and S 23–26.

S 53–56. Installed generating capacity in electric utilities, by type of prime mover, 1902–1957.

Source: See source for series S 19–22.

See also text for series S 19–22.

S 57–60. Installed generating capacity in industrial establishments, by type of prime mover, 1902–1957.

Source: See source for series S 23–26.

See also text for series S 23–26.

S 61–69. Installed generating capacity, by class of ownership, 1902–1957.

Source: Series S 61–68, see source for series S 19–22; series S 69, see source for series S 23–26.

See also text for series S 27–35.

S 70. Annual use of electric energy per residential customer, 1912–1956.

Source: 1912, Bureau of the Census, *Census of Electrical Industries, 1912;* 1917–1925, National Electric Light Association, *Statistical Supplement to the Electric Light and Power Industry in the United States*, Publication 1106, New York, 1931, p. 27; 1926–1956, Edison Electric Institute, *Edison Electric Institute Statistical Bulletin*, New York, 1952 issue, table 32, and 1956 issue, table 40.

Averages are based on data for customers and on use reported by the electric utilities. Data for appliances used and related matters are published annually in the statistical issue of *Electrical Merchandising* (McGraw-Hill Publishing Company, Inc., New York).

S 71–73. Percentage of dwelling units with electric service, 1907–1956.

Source: For census years, Bureau of the Census, Census of Housing (decennial) and Census of Agriculture (quinquennial); for intercensal years, various annual issues of the following: National Electric Light Association, *Statistical Supplement to the Electric Light and Power Industry in the United States*, New York; McGraw-Hill Publishing Company, Inc., *Electrical World*, New York; and Edison Electric Institute, *Edison Electric Institute Statistical Bulletin*, New York.

Some adjustments for comparability and coverage have been made in the source data by L. D. Jennings of the Federal Power Commission.

In the annual *Statistical Bulletin* of the Edison Electric Institute and in the statistical reports of their predecessor organization, the National Electric Light Association (cited above), data on the electrification of farms (series S 72) are presented. The information shown in these publications includes Bureau of the Census data and data compiled by the Rural Electrification Administration as well as material collected by the Institute or the Association. In the annual statistical numbers of the *Electrical World* (cited above), data are presented showing the percent of the population living in wired homes (series S 71). These percentages are generally based on the relation between the number of residential electric customers and population in census years. Percentages presented by the different sources indicated may vary from one to the other for intercensal years, depending on the statistical procedures used to determine the number of farms and dwelling units and related concepts applied. Among the items causing variations in the percentages of farms electrified, for example, are the inclusion or exclusion of farms without permanent dwelling units, farms with their own electric power plants, farms without service where distribution lines are within ¼ mile of the dwelling unit, or interpolation for the number of farms in intervening years between the various Censuses of Agriculture. The percentages shown are those considered reasonable and comparable to those for census years.

S 74–76, and S 78. Average price of electricity by class of service, 1907–1956.

Source: 1907–1924, based on a study by W. G. Vincent, Pacific Gas and Electric Company, *Edison Electric Institute Bulletin*, June 1936, p. 224 (adjusted by L. D. Jennings for comparability with the Federal Power Commission series); 1925–1956, Federal Power Commission, annual report, *Typical Electric Bills: Cities of 50,000 Population and More* (except that average prices for 1925-1934 have been adjusted from as of October 1, as originally published, to as of January 1 for comparability with the series subsequent to 1934).

Data shown in source for series S 78 are labelled "Industrial" which, in general, includes customers in the "Large light and power" classification as used by the Edison Electric Institute for series S 79.

The average bills for specified consumption are based on typical bills for residential and industrial service in cities with 50,000 or more inhabitants. These cities include about one-third of the total U.S. population. Since populations in adjacent areas are frequently served under the rate schedules effective in these cities, the bills reported indicate rate levels applicable to more than 70 percent of the total population.

Specifications for the computation of typical net monthly bills are prepared by the Federal Power Commission. Special rates for refrigeration, cooking, or water heating, where generally applicable, are used in computing the bill. Sales taxes computed separately and added to the bill computed under the rate schedules are not included in the bills reported.

Average bills are determined by multiplying the bill as of January 1 for each city by its population and dividing the sum of these products by the sum of the populations. Where two or more utilities serve a community with different bills, the population for each bill is determined by the proportion of customers served by class of service. Except for possible disproportionate shifts in population to higher or lower rate areas, changes in these averages indicate changes in rate levels.

S 77, S 79, and S 80. Average price of electricity for all users, by class of user, 1902–1956.

Source: 1902–1925, Bureau of the Census, *Census of Electrical Industries*, 1917 and 1922 reports; 1926-1956, Edison Electric Institute, *Edison Electric Institute Statistical Bulletin*, New York, 1954 issue, table 37, and 1956 issue, table 41.

These averages indicate the average revenue from electric service and will vary with average use and rate levels.

S 81. Electric energy, total use, 1902–1956.

Source: Summation of series S 82–93.

Total amount is equal to (*a*) utility sales of electric energy by class of service, plus (*b*) industrial generation minus sales to utilities, plus (*c*) use by utilities except in connection with the operation of generating plants, plus (*d*) energy furnished others without charge, plus (*e*) reported losses and unaccounted for, plus (*f*) estimated production for nonutility central stations not included in industrial generation (series S 23) minus sales to utilities as shown by utility reports on purchased energy. This total by years was compared with total net generation of utility and industrial plants (series S 15), plus net imports (series S 93), plus estimates of energy produced by central stations not included in series S 15. Differences of significance were analyzed, sources checked, explanations of the differences considered and adjustments made as necessary to account for all production or use. For 1939–1956, an appreciable portion of the energy estimated for plants not included in series S 15 and related series are variously reported to the Federal Power Commission or available from related material. For prior years, the amount estimated is based on relationships in benchmark years for which census or comparable type data on capacity, production, or use were available.

S 82–83. Electric energy, residential and commercial use, 1912–1956.

Source: 1912–1925, based on McGraw-Hill Publishing Company, Inc., *Electrical World*, annual statistical numbers, New York, and Bureau of the Census, *Census of Electrical Industries*, 1902–1927, reports at 5-year intervals; 1926–1944, Edison Electric Institute, *Electric Light and Power Industry in the United States*, New York; 1945–1956, Federal Power Commission, *Sales of Electric Energy by Class of Service*, monthly reports.

For 1912–1945, some combinations and adjustments were necessary for comparability with data for later years. These adjustments were made by L. D. Jennings of the Federal Power Commission.

Series S 82 includes residential use on farms and in rural areas but does not include (*a*) residential service charged in the rent of dwelling units, (*b*) service where energy is submetered by large apartment houses or operators of housing projects, (*c*) residential service secured in connection with commercial or other enterprises purchasing energy usually under commercial service classifications, or (*d*) irrigation sometimes included in the sales classification "Rural (district rural rates)." The Federal Power Commission data include

some residential service rendered by industrial and certain classes of publicly owned plants excluded from the Edison Electric Institute series.

Series S 83 includes purchases under commercial rate schedules for residential services by operators of apartment houses or housing projects where electric service is included in the rent of the facilities, and submetered service to small industrial establishments. Generally excluded are sales to very large commercial enterprises included in series S 91.

S 84. Electric energy, total industrial use, 1912–1956.

Source: Summation of series S 85 and S 90.

S 85. Use of electric energy for manufacturing industries, 1912–1956.

Source: 1912–1938, based on data in units of horsepower or kilowatt-hours presented in Bureau of the Census reports of the Census of Manufactures; 1939–1956, based on reports of the Census of Manufactures and Federal Power Commission report, *Industrial Electric Power, 1939-1946*.

Estimates or reported data were checked with information on industrial or large light and power sales of electric energy plus data available or developed for industrial generation with allowances for data applicable to series S 90, and, to a limited extent, series S 91. Adjustments that appeared reasonable in view of all information available, including that for later years, were made by L. D. Jennings of the Federal Power Commission for changes or variations in classification and coverage.

S 86. Use of electric energy for manufacture of nuclear fuels and related products, 1943–1956.

Source: 1943, Atomic Energy Commission, records; 1944–1956, Federal Power Commission, records.

Data for 1955–1956 were reported by suppliers of major installations of Atomic Energy Commission and by the Commission itself.

S 87. Use of electric energy for paper and chemical industries, 1912–1956.

Source: See source for series S 85.

The figures combine data for two major industry groups—paper and chemicals; they exclude major nuclear energy projects where included in the chemical industry group.

S 88. Use of electric energy for primary metals, 1912–1956.

Source: See source for series S 85.

Figures include ferrous and nonferrous metals.

S 89. Use of electric energy for other manufacturing industries, 1912–1956.

Source: See source for series S 85.

S 90. Use of electric energy for extracting industries, 1912–1956.

Source: 1912–1939, based on Bureau of the Census, *Census of Mineral Industries*, reports for 1919, 1929, and 1939; 1940–1946, Federal Power Commission, *Industrial Electric Power, 1939–1946;* 1947–1956, Federal Power Commission, records.

Data for 1947–1956 are based on generation reported by industrial plants in this classification. Data from trade associations and from technical publications on total output and on electric energy per unit computed for intercensal years for representative establishments were used to check data estimated for these years by other methods.

S 91. Use of electric energy for miscellaneous light and power, 1912–1956.

Source: See source for series S 82–83.

Depending on rate schedules applicable, figures include uses variously classified as other, industrial or large light and power (but not included in manufacturing or mineral industries), street and highway lighting, other sales to public authorities where service is not rendered under commercial or industrial rate schedules or purchased for resale by publicly owned systems, railroads and railways, interdepartmental or company use or furnished without charge by electric power systems, rural or other sales for irrigation, and generation in central stations and used by enterprises of various kinds not included in the use classifications shown separately. The figures include energy for certain classes of residential and commercial uses (series S 82–83), as noted for those series, and may also include some manufacturing and extracting plants for which data were not included in these series (S 85–90) for reasons indicated in text for series S 81.

S 92. Electric energy losses and use unaccounted for, 1912–1956.

Source: 1912–1936, Edison Electric Institute, *Edison Electric Institute Statistical Bulletin*, New York, monthly and annual issues, and *Electric Light and Power Industry in the United States* (annual); McGraw-Hill Publishing Company, Inc., *Electrical World* (annual), New York, and Bureau of the Census, *Census of Electrical Industries*, 1912–1932, reports at 5-year intervals; 1937–1956, Federal Power Commission, records.

Relation to total energy used varies from year to year with changes in the proportion of energy metered on the low or on the high side of transformers at the point of delivery or at the generating plant, as well as for changes in technological efficiency in the transmission and distribution of electric energy and its relation to the quantities handled.

S 93. Electric energy, net imports, 1912–1956.

Source: Federal Power Commission, records.

Data for 1940–1956 are based on annual survey for staff use. For prior years, data are based on FPC S-15, *Movement of Electric Energy Across State Lines and International Boundaries, 1940*, and on historical records and files to include exports and imports for industrial as well as utility purposes. Monthly and annual *Electric Power Statistics* published by the Dominion Bureau of Statistics, Ottawa, Canada, were also considered. Coverage in reports for the earlier years varied as did the treatment of energy delivered or received on long-term exchange agreements.

Series S 1–14. Total Horsepower of All Prime Movers: 1849 to 1955

[In thousands]

Year	Total	Automotive [1]	Nonautomotive											
			Total	Work animals	Inanimate									
					Total	Factories [2]	Mines	Railroads	Merchant ships, powered	Sailing vessels	Farms [3]	Windmills	Electric central stations	Aircraft [4]
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1955	7,143,723	6,632,121	511,602	4,141	507,461	35,579	30,768	60,304	10,801	5	206,590	59	137,576	25,779
1952	5,726,886	5,361,386	365,500	5,980	359,520	35,045	9,523	101,690	13,207	9	73,590	62	103,453	22,941
1950	4,747,871	4,403,617	344,254	7,040	337,214	32,921	9,167	110,969	11,032	11	63,090	59	87,965	22,000
1940	2,759,018	2,511,312	247,706	12,510	235,196	21,768	7,332	92,361	10,094	26	42,488	130	53,542	7,455
1939	----------	2,400,000	----------	----------	----------	21,239	7,149	90,500	10,000	----------	40,750	----------	52,115	6,000
1930	1,663,944	1,426,568	237,376	17,660	219,716	19,519	5,620	109,743	9,115	100	28,610	200	43,427	3,382
1929	----------	1,424,980	----------	----------	----------	19,328	5,450	111,881	9,017	----------	27,261	----------	40,014	3,091
1920	453,450	280,900	172,550	22,430	150,120	19,422	5,146	80,182	6,508	169	21,443	200	17,050	----------
1919	----------	230,432	----------	----------	----------	19,432	5,112	76,660	6,229	----------	20,796	----------	15,250	----------
1910	138,810	24,686	114,124	21,460	92,664	16,697	4,473	51,308	3,098	220	10,460	180	6,228	----------
1909	----------	7,714	----------	----------	----------	16,393	4,401	48,491	2,750	----------	9,311	----------	5,225	----------
1900	65,045	100	64,945	18,730	46,215	10,309	2,919	24,501	1,663	251	4,009	120	2,443	----------
1899	----------	32	----------	----------	----------	9,633	2,754	21,835	1,542	----------	3,420	----------	2,134	----------
1890	44,086	----------	44,086	15,970	28,116	6,308	1,445	16,980	1,124	280	1,452	80	447	----------
1889	----------	----------	----------	----------	----------	5,939	1,300	16,440	1,078	----------	1,233	----------	260	----------
1880	26,314	----------	26,314	11,580	14,734	3,664	715	8,592	741	314	668	40	----------	----------
1879	----------	----------	----------	----------	----------	3,411	650	7,720	703	----------	605	----------	----------	----------
1870	16,931	----------	16,931	8,660	8,271	2,453	380	4,462	632	314	----------	30	----------	----------
1869	----------	----------	----------	----------	----------	2,346	350	4,100	624	----------	----------	----------	----------	----------
1860	13,763	----------	13,763	8,630	5,133	1,675	170	2,156	515	597	----------	20	----------	----------
1859	----------	----------	----------	----------	----------	1,600	150	1,940	503	----------	----------	----------	----------	----------
1850	8,495	----------	8,495	5,960	2,535	1,150	60	586	325	400	----------	14	----------	----------
1849	----------	----------	----------	----------	----------	1,100	50	435	305	----------	----------	----------	----------	----------

[1] Includes passenger cars, trucks, buses, and motorcycles.
[2] Excludes electric motors.
[3] Excludes horses and other work animals, which are included in series S 4.
[4] Includes private planes and commercial airliners.

Series S 15–26. Net Production of Electric Energy, by Central Stations, by Type of Prime Mover: 1902 to 1957

[In millions of kilowatt-hours]

Year	Total utility and industrial				Electric utilities				Industrial establishments			
	Total	Hydro	Steam	Internal combustion	Total	Hydro	Steam	Internal combustion	Total	Hydro	Steam	Internal combustion
	15	16	17	18	19	20	21	22	23	24	25	26
1957	716,356	133,358	571,405	11,598	681,507	130,232	497,212	4,062	84,849	3,125	74,193	7,531
1956	684,804	125,237	548,306	11,261	600,668	122,029	474,552	4,087	84,136	3,208	73,754	7,174
1955	629,010	116,236	502,388	10,386	547,038	112,975	430,119	3,944	81,972	3,261	72,269	6,442
1954	544,645	111,640	423,151	9,854	471,686	107,069	360,884	3,733	72,959	4,571	62,317	6,071
1953	514,169	109,617	394,726	9,826	442,664	105,233	333,541	3,890	71,505	4,384	61,185	5,936
1952	463,055	109,708	344,695	8,652	399,224	105,102	290,385	3,737	63,831	4,606	54,310	4,915
1951	433,358	104,376	321,705	7,277	370,673	99,750	267,252	3,671	62,685	4,626	54,453	3,606
1950	388,674	100,884	281,000	6,790	329,141	95,938	229,543	3,660	59,533	4,946	51,457	3,130
1949	345,066	94,773	244,429	5,864	291,099	89,748	197,878	3,473	53,967	5,025	46,551	2,391
1948	336,808	86,992	243,730	6,086	282,698	82,470	196,928	3,300	54,110	4,522	46,802	2,786
1947	307,400	82,066	218,985	5,349	255,739	78,426	174,500	2,813	51,661	4,640	44,485	2,536
1946	269,609	88,150	181,825	4,634	223,178	78,406	142,412	2,360	46,431	4,744	39,413	2,274
1945	271,255	84,747	181,708	4,800	222,486	79,970	140,435	2,081	48,769	4,777	41,273	2,719
1944	279,525	78,905	195,664	4,956	228,189	78,945	152,328	1,916	51,336	4,960	43,336	3,040
1943	267,540	79,077	183,952	4,511	217,759	78,632	142,381	1,746	49,781	5,445	41,571	2,765
1942	233,146	69,133	159,725	4,288	185,979	68,871	120,479	1,629	47,167	5,262	39,246	2,659
1941	208,306	55,857	149,157	3,792	164,788	50,863	112,319	1,606	43,518	4,494	36,838	2,186
1940	179,907	51,659	124,941	3,307	141,837	47,321	93,002	1,514	38,070	4,338	31,939	1,793
1939	161,308	47,691	110,685	2,982	127,642	43,564	82,783	1,295	33,666	4,127	27,852	1,687
1938	141,955	48,394	93,561		113,812	44,279	68,423	1,110	28,143	4,115	24,028	
1937	146,476	48,272	98,204		118,913	44,013	73,891	1,009	27,563	4,259	23,304	
1936	136,006	42,750	93,256		109,816	39,058	69,359	899	26,690	3,692	22,998	
1935	118,935	42,253	76,682		95,287	38,372	56,144	771	23,648	3,881	19,767	
1934	110,404	35,922	74,482		87,258	32,684	53,939	635	23,146	3,238	19,908	
1933	102,655	36,730	65,925		81,740	33,457	47,709	574	20,915	3,273	17,642	
1932	99,359	35,998	63,361		79,393	32,878	45,922	593	19,966	3,120	16,846	
1931	109,373	32,106	77,267		87,350	29,028	57,685	637	22,023	3,078	18,945	
1930	114,637	34,874	79,763		91,112	31,190	59,293	629	23,525	3,684	19,841	
1929	116,747	37,038	79,709		92,180	32,648	58,965	567	24,567	4,390	20,177	
1928	108,069	37,297	70,772		82,794	32,874	49,370	550	25,275	4,423	20,852	
1927	101,390	32,924	68,466		75,418	28,474	46,615	329	25,972	4,450	21,522	
1926	94,222	30,355	63,867		69,353	25,603	43,422	328	24,869	4,752	20,117	
1925	84,666	26,112	58,554		61,451	21,798	39,367	286	23,215	4,314	18,901	
1924	75,892	24,138	51,754		54,662	19,489	34,955	218	21,230	4,649	16,581	
1923	71,399	23,421	47,978		51,229	18,940	32,093	196	20,170	4,481	15,689	
1922	61,204	21,262	39,942		43,632	16,875	26,579	178	17,572	4,387	13,185	
1921	53,125	18,732	34,393		37,180	14,703	22,311	166	15,945	4,029	11,916	
1920	56,559	20,311	36,248		39,405	15,760	23,489	156	17,154	4,551	12,603	
1917	43,429	13,948	29,481		25,438	10,100	15,338		17,991	3,848	14,143	
1912	24,752	7,387	17,365		11,569	4,500	7,069		13,183	2,887	10,296	
1907	14,121	4,003	10,118		5,862	----------	------		8,259	----------	------	
1902	5,969	2,166	3,803		2,507	----------	------		3,462	----------	------	

Series S 27–35. Net Production of Electric Energy, by Central Stations, by Class of Ownership: 1902 to 1957

[In millions of kilowatt-hours]

Year	Total utility and industrial	Electric utilities							Industrial establishments
		Total	Privately owned	Cooperatively owned [1]	Publicly owned				
					Total	Municipal	Federal	Other [1]	
	27	28	29	30	31	32	33	34	35
1957	716,356	631,507	480,948	3,020	147,544	27,850	109,176	10,518	84,849
1956	684,804	600,668	459,015	3,403	138,250	28,005	100,711	9,534	84,136
1955	629,010	547,038	420,869	3,084	123,135	25,852	89,064	8,219	81,972
1954	544,645	471,686	370,970	2,551	98,165	23,505	67,804	6,856	72,959
1953	514,169	442,664	354,271	1,972	86,421	21,625	58,064	6,732	71,505
1952	463,055	399,224	322,126	1,587	75,561	17,490	52,492	5,579	63,831
1951	433,358	370,673	301,845	1,324	67,504	17,617	44,120	5,767	62,685
1950	388,674	329,141	266,860	1,010	61,271	15,244	40,388	5,639	59,533
1949	345,066	291,099	238,112	847	57,140	13,410	38,102	5,628	53,967
1948	336,808	282,698	228,281	673	53,794	13,122	35,373	5,299	54,110
1947	307,400	255,739	208,105	406	47,228	12,415	29,877	4,936	51,661
1946	269,609	223,178	181,020	300	41,858	10,801	26,960	4,097	46,431
1945	271,255	222,486	180,926	242	41,318	9,624	28,000	3,694	48,769
1944	279,525	228,189	185,850	200	42,139	9,637	28,867	3,635	51,336
1943	267,540	217,759	180,247	187	37,325	9,223	24,485	3,617	49,781
1942	233,146	185,979	158,052	123	27,804	7,610	16,893	3,301	47,167
1941	208,306	164,788	144,290	78	20,420	7,023	10,793	2,604	43,518
1940	179,907	141,837	125,411	37	16,389	6,188	8,584	1,617	38,070
1939	161,308	127,642	115,078	----------	12,564	5,688	5,476	1,400	33,666
1938	141,955	113,812	104,090	----------	9,722	5,237	3,029	1,456	28,143
1937	146,476	118,913	110,464	----------	8,449	5,270	1,843	1,336	27,563
1936	136,006	109,316	102,293	----------	7,023	4,705	1,072	1,246	26,690
1935	118,935	95,287	89,330	----------	5,957	4,228	555	1,174	23,648
1934	110,404	87,258	82,079	----------	5,179	3,834	357	988	23,146
1933	102,655	81,740	76,668	----------	5,072	3,588	458	1,031	20,915
1932	99,359	79,393	74,488	----------	4,905	3,517	445	943	19,966
1931	109,373	87,350	82,597	----------	4,753	3,485	497	821	22,023
1930	114,637	91,112	86,109	----------	5,003	3,604	465	934	23,525
1929	116,747	92,180	87,514	----------	4,666	3,497	300	869	24,567
1928	108,069	82,794	78,207	----------	4,587	3,245	356	986	25,275
1927	101,390	75,418	70,920	----------	4,498	3,051	668	779	25,972
1926	94,222	69,353	65,480	----------	3,873	2,882	518	523	24,869
1925	84,666	61,451	58,685	----------	2,766	2,302	103	361	23,215
1924	75,892	54,662	52,315	----------	2,347	1,940	58	349	21,230
1923	71,399	51,229	49,044	----------	2,185	1,852	63	270	20,170
1922	61,204	43,632	41,660	----------	1,972	1,637	55	280	17,572
1921	53,125	37,180	35,456	----------	1,724	1,422	52	250	15,945
1920	56,559	39,405	37,716	----------	1,689	1,373	59	257	17,154
1917	43,429	25,438	24,399	----------	1,039	1,039	----------	----------	17,991
1912	24,752	11,569	11,032	----------	537	537	----------	----------	13,183
1907	14,121	5,862	5,573	----------	289	289	----------	----------	8,259
1902	5,969	2,507	2,311	----------	196	196	----------	----------	3,462

[1] Prior to 1940, cooperatively owned included in other publicly owned.

Series S 36–43. Consumption of Fuels by Electric Utilities: 1920 to 1957

Year	Net generation by fuel [1]	Fuel consumed						
		Total coal equivalent	Coal	Oil	Gas	Per kilowatt-hour		
						Coal	Oil	Gas
	36	37	38	39	40	41	42	43
	Mil. kw.-hr.	*1,000 short tons*	*1,000 short tons*	*1,000 42-gal. bbl.*	*Mil. cu. ft.*	*Lb.*	*Gal.*	*Cu. ft.*
1957	501,098	232,576	160,769	79,693	1,336,141	0.93	0.088	11.7
1956	478,487	223,733	158,279	72,711	1,289,311	0.94	0.085	11.9
1955	433,786	206,929	143,759	75,274	1,153,280	0.95	0.085	12.1
1954	364,354	180,367	118,385	66,745	1,165,498	0.99	0.089	12.4
1953	337,042	178,491	115,897	82,238	1,034,272	1.06	0.090	13.0
1952	293,640	160,872	107,071	67,218	910,117	1.10	0.095	13.3
1951	270,581	154,498	105,768	63,945	763,898	1.14	0.094	13.5
1950	232,813	138,421	91,871	75,420	628,919	1.19	0.094	14.1
1949	200,965	124,574	83,963	66,301	550,121	1.24	0.098	14.9
1948	199,796	130,122	99,586	42,645	478,097	1.30	0.107	15.9
1947	176,988	115,672	89,581	45,309	373,054	1.31	0.112	16.2
1946	144,555	93,471	72,197	36,316	306,942	1.29	0.108	16.3
1945	142,331	92,642	74,725	20,228	326,212	1.30	0.109	16.5
1944	153,868	99,251	80,084	20,862	358,784	1.29	0.109	16.6
1943	143,785	93,275	77,301	17,986	301,937	1.30	0.111	17.0
1942	121,585	79,075	66,257	15,236	235,208	1.30	0.115	16.7
1941	113,272	75,700	62,668	20,077	201,763	1.34	0.112	16.9
1940	93,963	62,942	51,474	16,325	180,096	1.34	0.112	16.5
1939	83,628	57,958	44,539	17,139	188,878	1.38	0.100	16.4
1938	69,255	48,560	38,394	12,942	165,504	1.40	0.113	17.1
1937	74,502	53,560	42,929	13,829	169,127	1.44	0.119	17.1
1936	69,823	50,144	40,085	14,079	154,084	1.44	0.118	17.1
1935	56,688	40,797	32,715	11,257	124,118	1.44	0.118	17.0
1934	54,418	39,367	34,414	10,258	127,071	1.45	0.120	17.2
1933	48,170	35,274	28,543	9,606	101,985	1.46	0.122	17.8
1932	46,422	34,489	28,056	7,583	107,103	1.49	0.122	17.6
1931	58,014	43,954	36,115	7,922	138,458	1.52	0.128	18.0

[1] Excludes generation by wood and waste fuels.

Series S 36–43. Consumption of Fuels by Electric Utilities: 1920 to 1957—Con.

Year	Net generation by fuel [1]	Fuel consumed						
		Total coal equivalent	Coal	Oil	Gas	Per kilowatt-hour		
						Coal	Oil	Gas
	36	37	38	39	40	41	42	43
	Mil. kw.-hr.	*1,000 short tons*	*1,000 short tons*	*1,000 42-gal. bbl.*	*Mil. cu. ft.*	*Lb.*	*Gal.*	*Cu. ft.*
1930	59,583	47,544	40,278	8,805	119,553	1.60	0.132	19.0
1929	59,154	49,039	41,827	9,783	112,353	1.66	0.137	19.7
1928	49,622	43,020	38,042	6,818	77,155	1.73	.143	20.9
1927	46,660	42,492	38,199	6,552	62,485	1.82	.153	21.5
1926	43,472	41,342	36,842	8,999	52,647	1.90	.157	22.9
1925	39,443	40,014	35,615	9,794	45,472	2.03	.165	23.9
1924	34,963	38,855	32,790	16,060	47,301	2.22	.182	26.3
1923	32,088	38,404	33,636	13,925	29,340	2.39	.195	29.3
1922	26,561	33,402	29,193	12,443	24,996	2.52	.209	31.2
1921	22,343	30,436	26,604	11,505	21,701	2.72	.220	31.0
1920	23,495	35,791	31,640	12,690	22,136	3.05	.254	36.9

[1] Excludes generation by wood and waste fuels.

Series S 44–48. Number of Electric Utility Generating Plants, and Production Per Kilowatt of Installed Generating Capacity: 1902 to 1957

Year	Number of plants				Production per kilowatt of capacity kw.-hr.	Year	Number of plants				Production per kilowatt of capacity kw.-hr.
	Total	Hydro	Steam	Internal combustion			Total	Hydro	Steam	Internal combustion	
	44	45	46	47	48		44	45	46	47	48
1957	3,517	1,360	1,043	1,114	5,056	1935	4,023	1,476	1,424	1,123	2,777
1956	3,534	1,365	1,037	1,132	5,108	1934	3,999	1,471	1,454	1,074	2,540
						1933	4,012	1,482	1,514	1,016	2,374
1955	3,587	1,381	1,045	1,161	5,037	1932	4,027	1,460	1,553	1,014	2,337
1954	3,627	1,387	1,045	1,195	4,862	1931	4,037	1,461	1,577	999	2,646
1953	3,686	1,406	1,041	1,239	5,098						
1952	3,698	1,412	1,030	1,256	5,051	1930	4,043	1,446	1,626	971	2,926
1951	3,806	1,428	1,048	1,330	5,124	1929	3,838	1,389	1,693	756	3,197
						1928	3,830	1,370	1,717	743	3,127
1950	3,867	1,458	1,051	1,358	4,984	1927	3,707	1,299	1,869	539	3,111
1949	3,888	1,465	1,054	1,369	4,862	1926	3,742	1,287	1,964	491	3,094
1948	3,879	1,467	1,045	1,367	5,191						
1947	3,865	1,479	1,045	1,341	4,984	1925	3,738	1,250	2,004	484	3,138
1946	3,854	1,488	1,046	1,320	4,441	1924	3,783	1,221	2,169	393	3,276
						1923	3,768	1,191	2,224	353	3,434
1945	3,886	1,505	1,057	1,324	4,487	1922	3,722	1,142	2,276	304	3,145
1944	3,933	1,510	1,082	1,341	4,699	1921	3,726	1,120	2,324	282	2,839
1943	3,959	1,507	1,101	1,351	4,687						
1942	3,899	1,489	1,100	1,310	4,257	1920	3,831	1,125	2,422	284	3,101
1941	3,882	1,478	1,116	1,298	4,008	1917	4,364	----	----	----	2,828
						1912	3,520	----	----	----	2,240
1940	3,918	1,474	1,158	1,291	3,601	1907	3,200	----	----	----	2,164
1939	3,988	1,487	1,195	1,256	3,346	1902	2,250	----	----	----	2,068
1938	3,903	1,479	1,252	1,172	3,110						
1937	3,918	1,478	1,288	1,162	3,364						
1936	3,896	1,471	1,337	1,088	3,145						

Series S 49–60. Installed Generating Capacity in Central Stations, by Type of Prime Mover: 1902 to 1957

[In thousands of kilowatts. As of December 31]

Year	Total utility and industrial				Electric utilities				Industrial establishments			
	Total	Hydro	Steam	Internal combustion	Total	Hydro	Steam	Internal combustion	Total	Hydro	Steam	Internal combustion
	49	50	51	52	53	54	55	56	57	58	59	60
1957	146,221	27,761	114,660	3,800	129,123	27,036	99,542	2,545	17,098	725	15,119	1,254
1956	137,342	26,386	107,251	3,705	120,697	25,654	92,591	2,452	16,645	782	14,660	1,253
1955	130,895	25,742	101,698	3,455	114,472	25,005	87,112	2,355	16,423	737	14,586	1,100
1954	118,878	24,238	91,250	3,390	102,592	23,211	77,102	2,279	16,286	1,027	14,148	1,111
1953	107,354	23,054	80,960	3,340	91,502	22,045	67,235	2,222	15,852	1,009	13,725	1,118
1952	97,312	21,416	72,620	3,276	82,227	20,419	59,679	2,129	15,085	997	12,941	1,147
1951	90,127	19,870	67,372	2,885	75,775	18,868	54,865	2,042	14,352	1,002	12,507	843
1950	82,850	18,674	61,495	2,681	68,919	17,675	49,333	1,911	13,931	999	12,162	770
1949	76,570	17,662	56,472	2,436	63,100	16,654	44,640	1,806	13,470	1,008	11,832	630
1948	69,615	16,635	50,751	2,229	56,560	15,652	39,304	1,604	13,055	983	11,447	625
1947	65,151	15,956	47,242	1,953	52,322	14,971	36,034	1,317	12,829	985	11,208	636
1946	63,066	15,828	45,442	1,796	50,317	14,848	34,313	1,156	12,749	980	11,129	640
1945	62,868	15,892	45,248	1,728	50,111	14,912	34,112	1,087	12,757	980	11,136	641
1944	62,066	15,696	44,637	1,733	49,189	14,586	33,541	1,062	12,877	1,110	11,096	671
1943	60,539	14,991	43,840	1,708	47,951	13,884	33,015	1,052	12,588	1,107	10,825	656
1942	57,237	13,947	41,593	1,697	45,053	12,842	31,169	1,042	12,184	1,105	10,424	655
1941	53,995	12,912	39,474	1,609	42,405	11,817	29,599	989	11,590	1,095	9,875	620
1940	50,962	12,804	37,138	1,520	39,927	11,224	27,775	928	11,035	1,080	9,363	592
1939	49,438	12,075	35,932	1,431	38,863	11,004	27,009	850	10,575	1,071	8,923	581
1938	46,873	11,682	35,191		37,492	10,657	26,066	769	9,381	1,025	8,356	
1937	44,370	11,186	33,184		35,620	10,176	24,763	681	8,750	1,010	7,740	
1936	43,582	11,037	32,545		35,082	10,037	24,441	604	8,500	1,000	7,500	
1935	42,828	10,399	32,429		34,436	9,399	24,471	566	8,392	1,000	7,392	
1934	42,545	10,345	32,200		34,119	9,345	24,253	521	8,426	1,000	7,426	
1933	43,037	10,330	32,707		34,587	9,334	24,759	494	8,450	996	7,454	
1932	42,849	10,258	32,591		34,387	9,258	24,646	483	8,462	1,000	7,462	
1931	42,287	10,190	32,097		33,698	9,090	24,162	446	8,589	1,100	7,489	
1930	41,153	9,650	31,503		32,384	8,585	23,385	414	8,769	1,065	7,704	
1929	38,708	8,925	29,783		29,839	7,818	21,704	322	8,869	1,112	7,757	
1928	36,782	8,800	27,982		27,805	7,702	19,790	313	8,977	1,098	7,879	
1927	34,574	7,927	26,647		25,079	6,802	18,078	199	9,495	1,125	8,370	
1926	32,936	7,650	25,286		23,386	6,405	16,792	189	9,550	1,245	8,305	
1925	30,087	7,150	22,937		21,472	5,922	15,368	182	8,615	1,228	7,387	
1924	25,923	6,224	19,699		17,681	5,024	12,535	122	8,242	1,200	7,042	
1923	23,235	5,682	17,553		15,643	4,507	11,026	110	7,592	1,175	6,417	
1922	21,317	5,229	16,088		14,192	4,129	9,965	98	7,125	1,100	6,025	
1921	20,605	5,002	15,603		13,519	3,902	9,527	90	7,086	1,100	5,986	
1920	19,439	4,804	14,635		12,714	3,704	8,920	90	6,725	1,100	5,625	
1917	15,494	3,886	11,608		8,994	2,786	6,128	80	6,500	1,100	5,400	
1912	10,980	2,794	8,186		5,165	1,694	3,395	76	5,815	1,100	4,715	
1907	6,809	1,906	4,903		2,709	906	1,765	38	4,100	1,000	3,100	
1902	2,987	1,140	1,847		1,212	290	914	8	1,775	850	925	

Series S 61–69. Installed Generating Capacity, by Class of Ownership: 1902 to 1957

[In thousands of kilowatts. As of December 31]

Year	Total utility and industrial	Electric utilities							Industrial establishments
		Total	Privately owned	Cooperatively owned [1]	Publicly owned				
					Total	Municipal	Federal	Other [1]	
	61	62	63	64	65	66	67	68	69
1957	146,221	129,123	97,376	922	30,824	8,640	19,649	2,535	17,098
1956	137,342	120,697	91,146	792	28,759	8,325	18,336	2,098	16,645
1955	130,895	114,472	86,887	776	26,809	7,795	16,962	2,052	16,423
1954	118,878	102,592	79,127	750	22,715	7,225	13,567	1,923	16,286
1953	107,354	91,502	71,201	619	19,682	6,570	11,358	1,754	15,852
1952	97,312	82,227	64,349	522	17,356	6,019	9,678	1,659	15,085
1951	90,127	75,775	60,192	482	15,101	5,293	8,099	1,709	14,352
1950	82,850	68,919	55,176	375	13,368	4,970	6,921	1,477	13,931
1949	76,570	63,100	50,484	283	12,333	4,727	6,210	1,396	13,470
1948	69,615	56,560	45,381	230	10,949	4,105	5,525	1,319	13,055
1947	65,151	52,322	41,986	168	10,168	3,825	5,027	1,316	12,829
1946	63,066	50,317	40,335	105	9,877	3,708	4,919	1,250	12,749
1945	62,868	50,111	40,307	87	9,717	3,586	5,081	1,050	12,757
1944	62,066	49,189	39,733	70	9,386	3,447	4,886	1,053	12,877
1943	60,539	47,951	39,128	66	8,757	3,419	4,322	1,016	12,588
1942	57,237	45,053	37,442	45	7,566	3,331	3,216	1,019	12,184
1941	53,995	42,405	36,041	30	6,334	3,158	2,371	805	11,590
1940	50,962	39,927	34,399	13	5,515	2,977	1,944	594	11,035
1939	49,438	38,863	33,908	----	4,955	2,807	1,650	498	10,575
1938	46,873	37,492	33,246	----	4,246	2,631	1,156	459	9,381
1937	44,370	35,620	31,958	----	3,662	2,476	833	353	8,750
1936	43,582	35,082	31,787	----	3,295	2,164	804	327	8,500
1935	42,828	34,436	31,820	----	2,616	2,002	300	314	8,392
1934	42,545	34,119	31,547	----	2,572	1,963	288	321	8,426
1933	43,037	34,587	32,163	----	2,424	1,879	232	313	8,450
1932	42,849	34,387	32,033	----	2,354	1,828	232	294	8,462
1931	42,287	33,698	31,498	----	2,200	1,696	231	273	8,589

[1] Prior to 1940, cooperatively owned included in other publicly owned.

Series S 61–69. Installed Generating Capacity, by Class of Ownership: 1902 to 1957—Con.

[In thousands of kilowatts]

Year	Total utility and industrial	Electric utilities					Industrial establishments
		Total	Privately owned	Publicly owned			
				Total	Municipal	Federal	Other [1]	
	61	62	63	65	66	67	65	69
1930	41,158	32,384	30,285	2,099	1,601	226	272	8,769
1929	38,708	29,839	27,952	1,887	1,424	214	249	8,869
1928	36,782	27,805	25,991	1,814	1,347	213	254	8,977
1927	34,574	25,079	23,418	1,661	1,210	209	242	9,495
1926	32,936	23,386	21,819	1,567	1,204	205	158	9,550
1925	30,087	21,472	20,045	1,427	1,125	198	104	8,615
1924	25,928	17,681	16,740	941	824	14	103	8,242
1923	23,235	15,648	14,787	856	752	14	90	7,592
1922	21,317	14,192	13,419	773	685	10	78	7,125
1921	20,605	13,519	12,797	722	634	10	78	7,086
1920	19,489	12,714	12,023	691	601	10	80	6,725
1917	15,494	8,994	8,412	582	582	----	----	6,500
1912	10,980	5,165	4,769	396	396	----	----	5,815
1907	6,809	2,709	2,500	209	209	----	----	4,100
1902	2,987	1,212	1,099	113	113	----	----	1,775

[1] Prior to 1940, cooperatively owned included in other publicly owned.

Series S 70–80. Growth of Residential Service, and Average Prices for Electric Energy: 1902 to 1956

Year	Residential service							Large light and power, average price (cents per kw.-hr.)			Average prices, all services, cents per kw.-hr.
	Annual use per customer (kw.-hr.)	Percentage of dwelling units with electric service			Average price (cents per kw.-hr.) monthly use of—			All consumption	Monthly use, 200,000 kw.-hr. [1]	All customers	
		All dwellings	Farm	Urban and rural nonfarm	25 kw.-hr.	100 kw.-hr.	250 kw.-hr.				
	70	71	72	73	74	75	76	77	78	79	80
1956	2,969	98.8	95.9	99.2	5.28	3.77	2.83	2.60	1.60	0.90	1.64
1955	2,751	98.4	94.4	98.8	5.20	3.75	2.81	2.64	1.58	0.91	1.67
1954	2,549	97.9	93.0	----	5.16	3.70	2.78	2.69	1.58	1.00	1.77
1953	2,346	97.2	91.4	----	5.12	3.69	2.77	2.74	1.58	1.00	1.77
1952	2,169	96.1	86.9	----	4.96	3.63	2.72	2.77	1.52	1.01	1.79
1951	2,004	95.2	82.2	----	4.96	3.62	2.70	2.81	1.51	1.00	1.78
1950	1,880	94.0	77.7	96.6	4.96	3.64	2.72	2.88	1.51	1.01	1.81
1949	1,684	93.0	72.9	----	5.00	3.68	2.75	2.95	1.55	1.05	1.86
1948	1,563	89.6	66.8	----	4.96	3.64	2.71	3.01	1.50	1.01	1.79
1947	1,438	86.2	60.2	----	4.92	3.64	2.71	3.09	1.45	0.97	1.77
1946	1,329	85.5	53.3	----	5.12	3.73	2.74	3.22	1.44	0.98	1.81
1945	1,229	85.0	48.0	93.0	5.28	3.76	2.76	3.41	1.43	0.93	1.73
1944	1,151	84.0	42.2	----	5.32	3.78	2.77	3.51	1.44	0.91	1.65
1943	1,070	81.3	40.0	----	5.32	3.80	2.78	3.60	1.43	0.90	1.66
1942	1,022	81.2	37.8	----	5.36	3.80	2.78	3.67	1.41	0.94	1.79
1941	986	80.0	35.0	----	5.36	3.83	2.79	3.73	1.41	1.00	1.90
1940	952	78.7	32.6	90.8	5.44	3.88	2.82	3.84	1.41	1.06	2.06
1939	897	77.3	27.4	----	5.60	3.96	2.88	4.00	1.43	1.12	2.16
1938	853	74.9	23.9	----	5.72	4.03	2.94	4.14	1.43	1.20	2.30
1937	805	73.1	18.3	----	5.80	4.10	3.00	4.30	1.48	1.14	2.17
1936	735	70.3	14.5	----	6.12	4.21	3.14	4.67	(2)	1.19	2.27
1935	677	68.0	12.6	83.9	6.40	4.47	3.56	5.01	1.54	1.30	2.46
1934	629	67.1	12.1	----	6.52	4.49	3.60	5.33	(2)	1.35	2.58
1933	600	66.7	11.8	----	6.68	4.55	3.65	5.52	(2)	1.38	2.66
1932	601	67.0	11.2	----	6.76	4.61	3.69	5.60	(2)	1.53	2.85
1931	583	67.4	10.7	----	6.80	4.86	4.00	5.78	(2)	1.47	2.75
1930	547	68.2	10.4	84.8	6.92	5.00	4.12	6.03	(2)	1.41	2.66
1929	502	67.9	9.2	----	7.04	5.21	4.33	6.33	(2)	1.38	2.57
1928	463	65.0	7.3	----	7.24	5.44	4.62	6.63	(2)	1.40	2.66
1927	446	63.1	5.9	----	7.54	5.70	4.87	6.82	(2)	1.46	2.71
1926	430	57.9	4.8	----	7.52	5.85	5.09	7.00	(2)	1.49	2.71
1925	396	53.2	3.9	69.4	7.68	6.03	5.14	7.30	(2)	(2)	(2)
1924	378	48.6	3.5	----	7.8	6.3	5.4	7.20	(2)	(2)	(2)
1923	368	44.2	3.0	----	7.9	6.4	5.6	7.20	(2)	(2)	(2)
1922	359	40.0	2.5	----	8.0	6.7	5.9	7.38	(2)	1.8	2.83
1921	347	37.8	2.0	----	8.2	6.7	5.9	7.39	(2)	(2)	(2)
1920	339	34.7	1.6	47.4	8.4	6.9	6.0	7.45	(2)	(2)	(2)
1917	268	24.3	----	----	7.9	6.6	5.9	7.52	(2)	1.2	2.1
1912	264	15.9	----	----	9.5	8.6	8.0	9.10	(2)	(2)	(2)
1907	----	8.0	----	----	10.9	10.3	9.5	10.5	(2)	(2)	2.7
1902	----	----	----	----	(2)	(2)	(2)	16.2	(2)	(2)	(2)

[1] Peak demand of 1,000 kilowatts.
[2] Not available.

Series S 81-93. Use of Electric Energy: 1902 to 1956

[In millions of kilowatt-hours]

Year	Total	Residential	Commercial	Industrial						Miscellaneous light and power	Losses and use unaccounted for	Net imports
				Total industrial	Manufacturing							
					Total	Nuclear energy	Paper and chemicals	Primary metals	Other	Extracting			
	S 81	S 82	S 83	S 84	S 85	S 86	S 87	S 88	S 89	S 90	S 91	S 92	S 93
1956 (prel.)	698,625	143,476	86,840	341,128	325,100	60,655	72,265	78,500	113,680	16,028	54,873	62,765	4,548
1955	637,321	128,401	79,389	315,208	299,261	50,105	65,594	75,960	107,602	15,942	50,921	59,339	4,068
1954	553,727	116,228	72,141	263,527	247,666	26,559	58,146	66,781	96,180	15,861	45,687	53,804	2,840
1953	522,419	104,146	66,533	254,260	238,480	14,727	57,725	68,897	97,131	15,780	44,818	50,654	2,008
1952	472,071	93,545	63,935	224,487	209,507	8,473	51,049	54,493	95,492	14,980	39,949	47,886	2,269
1951	442,046	83,093	58,643	214,522	200,322	5,533	49,494	54,497	90,798	14,200	38,798	44,803	2,187
1950	396,346	72,200	52,091	194,835	181,335	3,794	45,123	50,111	82,307	13,500	34,166	41,268	1,786
1949	351,831	63,869	44,830	169,274	156,524	3,614	38,227	44,844	70,339	12,750	34,720	38,050	1,588
1948	343,410	57,421	41,698	172,658	159,858	3,477	38,970	45,206	71,705	13,300	33,096	36,992	1,545
1947	313,926	49,417	37,152	157,197	144,247	3,238	34,996	40,645	65,373	12,950	34,788	33,457	1,915
1946	276,044	42,919	32,060	137,308	125,598	3,548	32,104	34,895	55,051	11,710	32,584	28,782	2,391
1945	275,028	37,749	28,091	146,261	134,955	3,099	36,780	37,871	57,705	11,306	33,864	27,001	2,562
1944	283,718	34,636	29,837	156,365	145,015	1,164	40,285	43,158	60,408	11,350	31,965	28,400	2,515
1943	270,215	31,271	28,192	155,671	143,995	31	39,670	44,978	59,321	11,676	26,017	26,567	2,497
1942	235,477	29,187	27,233	133,899	122,762	----------	33,463	36,257	53,042	11,137	19,958	22,782	2,418
1941	210,389	26,574	24,628	118,931	104,037	----------	27,830	29,630	46,577	9,894	22,574	20,351	2,331
1940	181,706	24,068	22,378	92,390	83,276	----------	22,776	22,782	37,718	9,114	23,173	17,588	2,114
1939	162,921	21,438	20,722	78,603	70,518	----------	19,040	17,632	33,846	8,085	24,378	15,891	1,894
1938	143,375	19,371	19,137	65,350	58,452	----------	15,829	14,504	28,119	7,398	22,982	14,227	1,808
1937	147,941	17,691	18,075	78,300	64,757	----------	17,536	16,068	31,153	8,543	22,124	14,924	1,827
1936	137,866	15,659	15,612	70,500	62,949	----------	17,046	15,620	30,283	7,551	20,266	13,773	1,556
1935	120,124	13,978	13,588	63,265	56,706	----------	15,356	14,070	27,280	6,559	15,902	12,054	1,337
1934	111,508	12,658	12,278	56,695	50,593	----------	13,700	12,554	24,339	6,102	17,561	11,082	1,234
1933	103,682	11,747	11,589	52,358	46,561	----------	12,609	11,553	22,399	5,797	16,599	10,422	967
1932	100,353	11,875	12,106	48,614	43,504	----------	11,781	10,795	20,928	5,110	16,952	10,162	644
1931	110,467	11,738	13,544	56,512	50,410	----------	13,651	12,508	24,251	6,102	16,240	11,224	1,209
1930	115,783	11,018	13,944	61,023	53,930	----------	14,604	13,382	25,944	7,093	16,453	11,753	1,592
1929	117,914	9,778	13,106	63,279	55,122	----------	14,983	13,543	26,596	8,157	13,896	11,987	1,423
1928	109,150	8,619	11,692	59,750	52,699	----------	14,271	13,076	25,352	7,051	16,753	10,763	1,573
1927	102,404	7,676	10,766	57,383	51,012	----------	13,814	12,658	24,540	6,371	15,118	9,842	1,619
1926	95,164	6,827	9,485	52,750	46,350	----------	12,551	11,501	22,298	6,400	15,524	9,085	1,493
1925	85,513	6,020	9,345	45,500	39,725	----------	10,757	9,857	19,111	5,775	15,294	8,081	1,273
1924	76,651	5,080	8,634	40,300	34,967	----------	9,468	8,677	16,822	5,333	14,132	7,215	1,290
1923	72,113	4,580	8,027	38,250	32,585	----------	8,824	8,085	15,676	5,665	13,137	6,788	1,331
1922	61,816	3,916	7,180	32,200	27,364	----------	7,410	6,790	13,164	4,836	11,752	5,803	965
1921	53,656	3,532	6,125	28,000	23,998	----------	6,497	5,958	11,543	4,007	10,026	4,964	1,009
1920	57,125	3,190	6,150	31,500	26,913	----------	7,288	6,678	12,947	4,587	10,065	5,280	940
1917	43,868	1,731	5,213	28,750	20,750	----------	5,619	5,149	9,982	3,000	8,532	3,421	1,216
1912	25,000	910	4,076	11,250	9,250	----------	2,505	2,295	4,450	2,000	6,671	1,562	531
1907	14,262	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------
1902	6,029	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------